

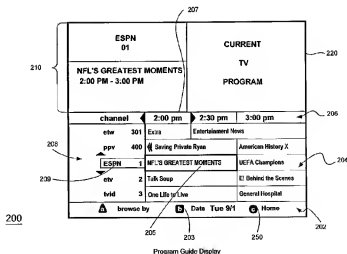
PCT

(10) International Publication Number
WO 01/56273 A1

- Published:**
— with international search report

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

- (54) Title: SYSTEM AND METHOD FOR REFERENCE POINT NAVIGATION WITHIN A PROGRAM GUIDE



(57) **Abstract:** A method and system that allows a user to, with a single button press on a remote control, quickly navigate within a program guide to an established reference point, such as the program information associated with the last viewed channel and the current time. The establishment of a reference point provides a subscriber with a known position within program information that may cover weeks of time, thousands of channels, and a variety of categories or sorting methods. The subscriber that has advanced through many hours and channels of program information is provided with a method of easily navigating to a known reference within the program information.

SYSTEM AND METHOD FOR REFERENCE POINT NAVIGATION WITHIN A PROGRAM GUIDE

5 CROSS-REFERENCE TO RELATED APPLICATIONS

The present application claims priority to U.S. Provisional Patent Application Number 60/138,757, Jerding et al., entitled *Enhanced Interactive Program Guide User Interface for a Home Communications Terminal*, filed 11 June 1999, and to U.S. Provisional Patent Application
10 Number 60/170,302, Jerding et al., entitled *Home Communications Terminal Resident Application*, filed 13 December 1999.

15 FIELD OF THE INVENTION

The present invention relates to a television program guide in a subscriber television system and, more specifically, to allowing a user to quickly navigate within the program guide to an established reference point such as the program information associated with the last channel viewed and the current time.

20

BACKGROUND OF THE INVENTION

In a subscriber television system, television services have traditionally included little more
25 than an analog broadcast video source. Recently, however, digital programming has become a reality with the home communications terminal ("HCT"), otherwise known as the set-top box, becoming a powerful computing device for accessing video services, and navigating a user through the maze of available services. In addition to supporting traditional analog broadcast video and functionality, digital HCTs (or "DHCTs") now also support an increasing number of
30 services that are not analog, but rather digital; are not broadcast, but rather two-way communication as for example video-on-demand; and are not video, but are data such as e-mail or web browsers. These are all in addition to the host of other television services that are available to subscribers using DHCTs, examples of which include audio and audio/visual programming, advanced navigation controls, impulse pay-per-view technology, and online
35 commerce to name but a few. There is an increase by several orders of magnitude of the services that are increasingly available in the digital world.

As more services and applications are provided, subscriber television systems are providing television program information to the HCT so that the subscriber can view the program information on the television itself. This program information has traditionally been organized for presentation purposes into a program guide format that presents the guide information by time and channel only. The program guides have been little more than grids with channel number and time presented on the x and y axes and the program information about the related programs within the grid. The program guide can, for instance, automatically scroll through the available television channels to present the program information, such as name and description, starting at the current time and for a set time range into the future, usually an hour and a half to two hours.

With the advent of program guide "browsers", including interactive program guides (IPG), mini-guides, and browse banners for use in subscriber television systems, subscribers can linearly scan program information by time and channel while watching the tuned channel. In analog systems that offer a limited number of television channels, these browsers permit the subscriber to easily scan the available programs one-by-one in order of channel number. A subscriber can scan program information typically by using several buttons or keys on a remote control to scroll through the programs. Each press of the button or keystroke changes the selected guide channel or time by one unit. However, many digital subscriber television systems provide hundreds or even thousands of channels and several days or even weeks of programming information for each of the multitude of channels. In such systems, scanning program information sequentially can require hundreds of keystrokes by the subscriber and can consume tremendous amounts of time. Furthermore, locating a particular program can be quite difficult if the subscriber does not already know the channel number for the program for which they are searching.

In addition, traditional subscriber television systems have failed to provide the types of complex, graphically rich interactive program guide applications that are becoming popular with more sophisticated consumers of current digital systems. The operator of a subscriber television system needs to provide a program guide that is as user friendly as possible to encourage the subscribers to purchase, access, and use the additional programs and services they can locate through a program guide. To help make the guide as user friendly as possible, it would be beneficial for the subscriber to be able to easily navigate to an established reference point should they lose their way while navigating all the program information that is available in the program guide. Even with simple program guides a standard reference is useful and with more complicated and interactive program guides it becomes essential.

Thus in a user friendly subscriber television system program guide, there is a need for an efficient method and system that allows a user to quickly navigate within a program guide to an established reference point.

5

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is an overview of a Subscriber Television System.

FIG. 2 is an illustration of a display associated with a program guide.

10 FIG. 3 illustrates a method for navigating within program information to an established reference point.

15

DETAILED DESCRIPTION

The present invention is directed to an efficient method and system that allows a user to quickly navigate within a program guide to an established reference point, such as the program information associated with the last viewed channel and the current time. To help make the guide as user friendly as possible, the present invention provides a way for a subscriber, by pushing a single button on a remote control, to easily navigate to an established reference point should they lose their way while navigating all the program information that is available in program guides.

20

The present invention is best understood within the context of a subscriber television system. Referring now to the drawings, in which like numerals represent like elements throughout the several figures, a subscriber television system and exemplary embodiments of the present invention will be described.

25

FIG. 1 is an overview of a subscriber television system 100. In the subscriber television system 100, a headend 110 receives and combines television programming and information for distribution to the subscriber locations 150 via a transmission medium 130, such as a two-way digital hybrid fiber-coax (HFC) network. A Home Communications Terminal (HCT) 155 interfaces to the transmission medium 130 and provides the subscriber television services to be displayed on a display device, such as television 156. Program information is transmitted from the headend 110 to the HCT 155. The program information is stored in the HCT 155. The information can be stored as a database, such as an electronic program guide (EPG) database. The HCT 155 can cause the program information to be displayed on television 156 by retrieving program information from an EPG database. The display format, such as a program guide, is controlled by the HCT 155. A central processing unit (CPU) in HCT 155 reads the program

35

information from the EPG database stored in memory of the HCT155. The CPU would process and format the program information for display. The HCT 155 sets the parameters for displaying the program information based on downloaded instructions from the headend 150 or instructions initially stored or downloaded to HCT 155 during its initial system staging and set-up.

- 5 An example of a program guide for use within a subscriber television system is provided in U.S. Patent Number 6,005,631, entitled "*Method for Searching Electronic Program Guides*", which is incorporated herein by reference.

FIG. 2 is an illustration of a display associated with a program guide. The program guide display 200 includes several blocks of information organized to allow a user to easily scan the
10 program information and select program information of interest. The blocks include a Instruction block 202, Program Title block 204, Time block 206, Channel Identification block 208, Program Description block 210, and Picture block 220. A viewer or subscriber navigates through the displayed program, selects desired program information, invokes navigation, or invokes navigation direction by activating an input from a front panel or an input device such as a remote
15 control unit or a keyboard.

Information displayed on an EPG graphical user interface (GUI) is representative of the program information stored in the memory of HCT 155 as the EPG database. The information displayed in an EPG GUI is representative of the machine state of the EPG software application executing in the HCT 155 computational resources, such as the CPU and memory. Alternatively
20 the EPG database, in whole or part, may reside in a data storage device such as an optical or magnetic hard drive internally part of HCT 155 or externally connected to HCT 155. In another embodiment, the EPG database resides in a data server located in a headend or node of the subscriber television system. The EPG database can be accessed via a network interface such as a channel tuner.

In Fig. 2 the Instruction block 202 displays navigational information associated with the program guide and, in this example, a date. Pressing the A button on a remote control unit allows the subscriber to select from a listing of alternative display options in a pop-up dialog window. The date is user selectable and allows the user to navigate to other dates by pressing the B button on a remote control, as indicated by the Date icon 203. Pressing the B button allows the
30 subscriber to select from a pop-up date display window. Time block 206 displays a highlighted time 207, 5:00 PM, and a time range associated with highlighted time 207. The highlighted time 207 can be the time associated with entry into a program guide or a user selected time. Channel Identification block 208 displays a highlighted channel 209 and a service provider, ESPN, associated with the highlighted channel 209. The highlighted channel 209 can be the channel
35 associated with entry into a program guide or a channel selected by the user. Program Title block

204 displays the simple program information associated with the highlighted channel 209, the highlighted time 207, and the date indicated in the Instruction block 202. The Program Description block 210 displays additional program information for the highlighted program 205 associated with the highlighted channel 209 and the highlighted time 207. Picture block 220 displays a scaled down video of the currently tuned channel, a still picture, a video clip, live video of the last channel viewed, information or video associated with the highlighted program 205, or information or video associated with the program guide. The program guide display has been described in general terms. There are a wide variety of other display formats for program guides and the specific format or content of a program guide does not limit the present invention.

FIG. 3 illustrates an exemplary method 300 for navigating within program information to an established reference point. A reference point is established with respect to the display parameters of the program information at step 302. The reference point is a set of parameters associated with the displayed program information such as the view the user has selected, the channel to which the HCT is tuned, the current time, the theme of the current program, and the alphabetical title of the current program. The reference point can be stored in the HCT 155 memory as part of an EPG software application machine-state associated with the reference point. Storing a machine-state encompasses storage of the display parameters, program information, and other data required to re-create the machine-state. The program information can either be stored as pointers to records within the EPG database from which the information can be accessed and retrieved or as an instance of the EPG record that is copied and saved in memory as data. In an embodiment, the reference point is a machine-state for which information is stored in memory and that, responsive to user input, the EPG software application and a CPU execution can retrieve, process, and recreate the machine-state of the reference point. The reference can be a single parameter, such as time, or a combination of parameters such as time and channel. Typically the system operator will define and establish the reference point. At step 304, a portion of the program information is displayed in the form of a program guide. A subscriber can scroll through the program guide to display different portions of the program information of interest to the subscriber. When the subscriber desires to go to the established reference point the subscriber provides user input to the system at step 306. The user input is typically the pressing of a single button on a remote control. After receiving the user input, the display is changed to show the portion of the program information associated with the reference at step 308. This can be accomplished, for example, by a CPU retrieving the display parameters and program information associated with the reference point that were previously stored in memory and then processing the data to cause the display of the program guide presentation corresponding to the reference

point or reference point's machine-state. Thus method 300 allows a subscriber with a single button press display the program information associated with an established reference point.

In one embodiment, the present invention allows a user to quickly navigate within a program guide to the program information associated with an established reference point
5 "Home", as indicated in FIG. 2 by the Home icon 250 in the Instruction block 202. In this embodiment, the "Home" reference is the current time, current date, and the channel number of the last channel viewed prior to the display of the program guide. So, when the user presses the C button on a remote control, the program guide display 200 changes so that the highlighted time
10 207 is the current time on the current date and the highlighted channel 209 is the channel number of the last channel viewed prior to the display of the program guide. The user can always return to this reference point with a single push of the "C" button, regardless of how many days or channels away they are after navigating within the program guide.

The present invention can also be used with other methods of displaying program information, such as browse banners, barkers, category window, or Pay-per-view guides, to allow
15 a user to quickly navigate to program information associated with an established reference point. A browse banner allows a user to view the current and future programming for a single channel or category. Even with a simple browse banner the user could end up at program information days into the future. The use of a single button to quickly return to the program information for the current time provides a user friendly navigation option for the subscriber. Program
20 information displayed by Theme could use a reference point associated with the theme of the current program at the current time and date or it could be associated with the first alphabetical listing of the theme of the current program. Program information displayed by Title could use a reference point associated with the first letter of the current program at the current time and date or it could be the first title listed in the program information by alphabetical order and a selection
25 within that first title information.

Establishing and defining the point of reference can be accomplished by a variety of methods. The system operator for subscriber television system 100 located at headend 110 can set the program guide parameters such that the established reference point is the last viewed channel, prior to the display of the program guide, and the current time and date. The system operator using system control parameters could establish any of a variety of reference points for the program guide and other program information related display methods. In addition, the established reference point could be defined by or related to a subscriber selection. The subscriber could be allowed to select from a list of alternative reference points provided by the system control parameters or the established reference point could be associated with a Favorite setting within a program guide. The Favorite associated reference point is not directly selected by the subscriber but would be related to the subscriber's selection of a Favorite channel. For example, a subscriber selects ESPN as their favorite channel. The established reference point could then be defined as the ESPN related channel and the current time and date. Pushing the "C" button on a remote control, while viewing the program guide, would always return this subscriber to the program information for ESPN at the current time and date.

In another embodiment, pressing the "C" or HOME key generates the display of a menu of reference points from which a user can select. The user could scroll up and down using directional arrows on a remote control unit and use a select button to chose a highlighted reference point. The machine-state of each reference point would be stored a priori in memory for quickly enacting a reference point machine-state upon selection.

CONCLUSION

From the foregoing, it will be appreciated that the present invention provides an efficient method and system that allows a user to quickly navigate within a program guide to an established reference point, such as the program information associated with the last viewed channel and the current time.

The present invention has been described in relation to particular embodiments, which are intended in all respects to be illustrative rather than restrictive. For example, the exemplary reference point, Home, could instead be labeled with any of a variety of names such as Jump, Start, Return, or Current. The reference point could be any of a variety of points with in the program information including other combinations of time, channel, category, and position within the program guide. For example, the reference point could be the last channel viewed prior to the display of the program guide at the last user selected time (not the current time) or a

favorite channel at the current time or a single dimension parameter such as a selected category of program information, such as Sports or Movies.

The references to the last viewed channel or to the program viewed immediately prior to causing the program information to be displayed provides a reference from the subscribers
5 perspective, typically while displaying the program information the HCT remains tuned to that channel until another channel is selected.

Those skilled in the art will appreciate that although the present invention has been described in the context of icon displayed with the program information, a user could be informed of the functionality of the present invention via other methods such as a separate
10 display, help window, or an instruction manual, and that other embodiments would not require an icon. In addition, there could be multiple icons representing different reference points.

In conclusion, while exemplary embodiments of the invention have been illustrated and described, it will be clear that the invention is not so limited. Alternative embodiments will be apparent to those skilled in the art to which the present invention pertains without departing from
15 its spirit or scope. Accordingly the appended claims rather than the foregoing description define the scope of the present invention.

What is claimed is:

CLAIMS

1. A method responsive to user input for displaying program information associated with a reference point established within a display of the program information, the method comprising
5 the steps of:
 establishing the reference point based on at least one parameter associated with the display of the program information;
 causing a portion of the program information to be displayed;
 receiving user input requesting display of the program information associated with the
10 reference point; and
 causing the display of the program information associated with the reference point.
2. The method of claim 1, wherein the program information is displayed as a program
15 guide.
3. The method of claim 1, wherein the program information is displayed as a browse
banner.
4. The method of claim 1, wherein the at least one parameter is chosen from a group of
20 parameters consisting of a current time, a current day, a channel number of a program viewed immediately prior to the causing the portion of the program information to be displayed, a favorite channel, a title, a program theme category, a favorite category, a portion of the program information associated with a next day, and a portion of the program information associated with
a previous day.
- 25 5. The method of claim 1, wherein the reference point is established by a subscriber television system operator.

6. A method responsive to user input for displaying program information associated with a reference point established within a program guide, the method comprising the steps of:

establishing the reference point within the program guide based on a current time, a current date, and a channel number associated with a program viewed immediately prior to

5 entering the program guide;

causing the program guide to be displayed;

receiving user input requesting display of the program information associated with the reference point; and

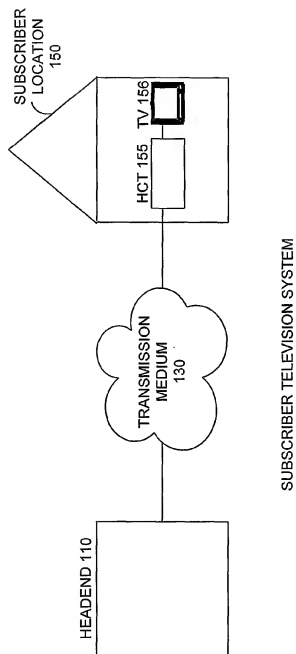
10 causing, within the program guide, the display of the program information associated with the reference point.

7. The method of claim 6, wherein the reference point is established by a subscriber television system operator.

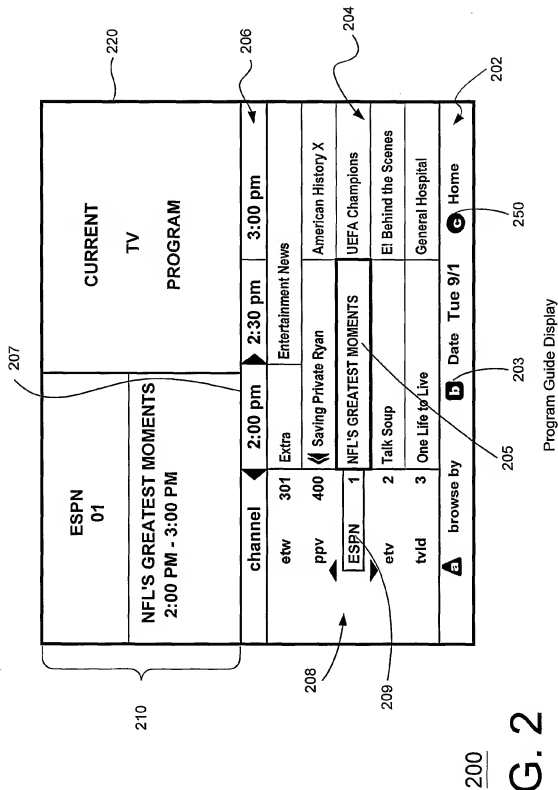
15

8. A subscriber television system responsive to user input for displaying program information associated with a reference point established within a display of the program information, the system comprising:
- a headend for transmitting the program information and system control parameters;
 - 5 a transmission medium over which the program information and the system control parameters are transmitted; and
 - at least one home communication terminal, the home communications terminal being operative to
 - establish the reference point within the display of the program information based on
 - 10 at least one parameter associated with the display of the program information and the system control parameters transmitted from the headend;
 - cause a portion of the program information to be displayed;
 - receive user input requesting display of the program information associated with the reference point; and
 - 15 cause the display of the program information associated with the reference point.
9. The system of claim 8, wherein the home communications terminal further being operative to cause to be displayed, with the portion of the program information, an icon indicating a button on a remote control that a system user would press to provide the user input
- 20 requesting display of the program information associated with the reference point.
10. The system of claim 8, wherein the user input is received from a remote control device.
11. The system of claim 8, wherein the reference point is established responsive to system
- 25 control parameters.

1/3

100**FIG. 1**

2/3



3/3

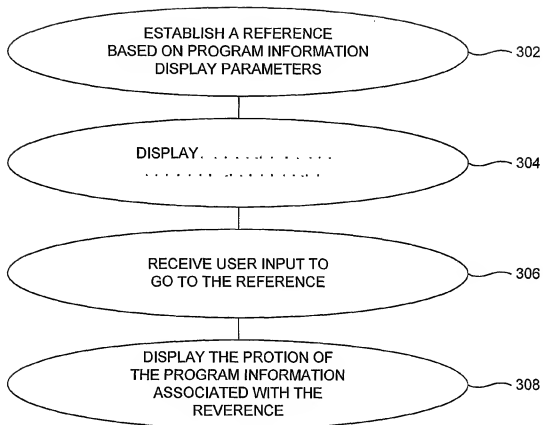
300

FIG. 3

INTERNATIONAL SEARCH REPORT

 Int. appl. No.
PCT/US 01/02490

 A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 H04N5/445

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 7 H04N G06F

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the International search (name of data base and, where practical, search terms used)

EPO-Internal, PAJ, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	WO 97 34414 A (GUIDE E INC ;KWOH DANIEL S (US); LEUNG ELSIE Y (US); MANKOVITZ ROY) 18 September 1997 (1997-09-18) abstract	1,2,4,6, 8-10
Y	page 2, line 1 - line 20 page 4, line 15 - line 24 page 6, line 13 - line 26 page 9, line 18 - line 23 claim 1; figures 3,6	5,7,11
X	US 6 014 184 A (DAVIS BRUCE ET AL) 11 January 2000 (2000-01-11) abstract	1-4
A	column 14, line 1 - line 39 column 17, line 48 - line 50 column 27, line 41 - column 28, line 2 figures 4,11,48 --- -/-	6,8

☒ Further documents are listed in the continuation of box C.☒ Patent family members are listed in annex.

* Special categories of cited documents:

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier document but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

"Z" document member of the same patent family

Date of the actual completion of the international search

7 May 2001

Date of mailing of the international search report

18/05/2001

Name and mailing address of the ISA

 European Patent Office, P.B. 5818 Patentlaan 2
NL - 2280 LV Rijswijk
Tel. (+31-70) 340-2040, Tx. 31 651 epo nl,
Fax: (+31-70) 340-3016

Authorized officer

Fantini, F

INTERNATIONAL SEARCH REPORT

Int. Appl. No.
PCT/US 01/02490

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	EP 0 909 095 A (DISCOVERY COMMUNICAT INC) 14 April 1999 (1999-04-14) page 8, line 48 - line 56 page 9, line 26 - line 37 page 11, line 49 - line 53 page 16, line 48 - line 53 page 18, line 19 - line 28 -----	5,7,11
A	US 6 005 631 A (HOUSER PETER B ET AL) 21 December 1999 (1999-12-21) abstract column 9, line 45 -column 10, line 52 figures 5,10 -----	1,6,8
A	NETSCAPE COMMUNICATIONS CORPORATION: "NETSCAPE NAVIGATOR HELP" NETSCAPE NAVIGATOR SOFTWARE USER DOCUMENTATION, 'Online! 10 August 1997 (1997-08-10), XP002166369 Retrieved from the Internet: <URL:http://home.netscape.com> 'retrieved on 2001-05-02! page 1 page 6 -page 7 page 11 page 16 page 19 page 38 -----	1,6,8
A	NETSCAPE COMMUNICATIONS CORPORATION: "Netcaster Developer's Guide" DEVEDGE ONLINE DOCUMENTATION, 'Online! 25 September 1997 (1997-09-25), XP002166370 Retrieved from the Internet: <URL:http://developer.netscape.com/docs/ma nuals/netcast/devguide/index.html> 'retrieved on 2001-05-02! the whole document -----	1,6,8

INTERNATIONAL SEARCH REPORT

Information on patent family members

Int. Application No

PCT/US 01/02490

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
WO 9734414 A	18-09-1997	AU 720866 B	15-06-2000
		AU 2212497 A	01-10-1997
		AU 712661 B	11-11-1999
		AU 2330597 A	01-10-1997
		BR 9708052 A	27-07-1999
		BR 9708196 A	27-07-1999
		CA 2251687 A	18-09-1997
		CA 2251726 A	18-09-1997
		CN 1218597 A	02-06-1999
		CN 1218598 A	02-06-1999
		EP 0888688 A	07-01-1999
		EP 0886964 A	30-12-1998
		JP 2000507407 T	13-06-2000
		JP 2000507408 T	13-06-2000
		WO 9734413 A	18-09-1997
		US 6154203 A	28-11-2000
		US 6147715 A	14-11-2000
US 6014184 A	11-01-2000	US 5589892 A	31-12-1996
		US 5781246 A	14-07-1998
		AU 700302 B	24-12-1998
		AU 6258596 A	30-12-1996
		BR 9609120 A	24-08-1999
		CA 2223057 A	19-12-1996
		CN 1190517 A	12-08-1998
		EP 0856227 A	05-08-1998
		JP 11505094 T	11-05-1999
		PL 323914 A	27-04-1998
		WO 9641478 A	19-12-1996
		AU 712344 B	04-11-1999
		AU 5572996 A	18-11-1996
		BR 9608005 A	05-01-1999
		CA 2218993 A	31-10-1996
		EP 0823179 A	11-02-1998
		JP 11501481 T	02-02-1999
		PL 323047 A	02-03-1998
		WO 9634491 A	31-10-1996
		US 5585866 A	17-12-1996
		US 5822123 A	13-10-1998
EP 0909095 A	14-04-1999	AT 177277 T	15-03-1999
		AT 199294 T	15-03-2001
		AT 176840 T	15-03-1999
		AT 192005 T	15-05-2000
		AT 190180 T	15-03-2000
		AT 183352 T	15-08-1999
		AT 176841 T	15-03-1999
		AT 197366 T	15-11-2000
		AU 715683 B	10-02-2000
		AU 4440797 A	29-01-1998
		AU 712157 B	28-10-1999
		AU 4532597 A	05-02-1998
		AU 693775 B	09-07-1998
		AU 5732994 A	04-07-1994
		AU 692427 B	11-06-1998
		AU 5733094 A	04-07-1994
		AU 691479 B	21-05-1998
		AU 5733194 A	04-07-1994

INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

PCT/US 01/02490

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
EP 0909095 A		AU 692428 B	11-06-1998
		AU 5733294 A	04-07-1994
		AU 5736394 A	04-07-1994
		AU 5845894 A	22-06-1994
		AU 5869894 A	04-07-1994
		AU 716184 B	24-02-2000
		AU 6066798 A	04-06-1998
		AU 716182 B	24-02-2000
		AU 6066898 A	04-06-1998
		BR 9307619 A	15-06-1999
		BR 9307620 A	10-08-1999
		BR 9307621 A	15-06-1999
		BR 9307622 A	15-06-1999
		BR 9307623 A	16-05-2000
		BR 9307624 A	15-06-1999
		BR 9307625 A	31-08-1999
		CA 2151456 A	23-06-1994
		CA 2151457 A	23-06-1994
		CA 2151458 A	23-06-1994
		CA 2151459 A	23-06-1994
		CA 2151460 A	23-06-1994
		CA 2151461 A	09-06-1994
		CA 2151462 A	23-06-1994
		CN 1259826 A	12-07-2000
		CN 1259827 A	12-07-2000
		CN 1276682 A	13-12-2000
		CN 1276683 A	13-12-2000
		CN 1276684 A	13-12-2000
		CN 1276685 A	13-12-2000
		CN 1284814 A	21-02-2001
		CN 1280446 A	17-01-2001
US 6005631 A	21-12-1999	US 6104269 A	15-08-2000